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Record of Decision:

YELLOW WATER ROAD DUMP
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Record of Decision for Operable Unit Two
The Decision Summary

Yellow Water Road Site

Baldwin, Duval County, Florida

Prepared by:
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

RECORD OF DECISION
OPERABLE UNIT TWO (GROUND WATER)

DECLARATION

SITE NAME AND LOCATION

Yellow Water Road Site
Baldwin, Duval County, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit Two at the Yellow Water Road Site in Baldwin, Duval County, Florida, which was chosen in accordance with the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for this site.

The State of Florida, as represented by the Department of Environmental Regulation (FDER), concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The remedy selected by EPA has been conducted in two separate operable units. Operable Unit One addressed the source of the contamination by excavating, stabilizing, and solidifying the PCB contaminated soils. Operable Unit Two will address the appropriate remediation for the ground water.

The major components of the selected remedy for Operable Unit Two include:

- the implementation of a long-term ground water monitoring program;

- the construction of four additional ground water monitoring wells downgradient of the source area, two wells (one in the Upper Sand Unit and one in the Lower Sand Unit) will be located 20 feet downgradient of monitoring cluster 7 and two (one in the Upper Sand Unit and one in the Lower Sand Unit) located 20 feet downgradient of monitoring cluster 8;

- the implementation of institutional controls, which would include deep restrictions, zoning controls, and water supply well permitting prohibitions;

- the contingent construction of the appropriate number of ground water extraction wells which will be determined during remedial design. However, costs are currently based on two extraction wells, one in the Upper Sand Unit and one in the Lower Sand Unit, both located near the western boundary of the former operational area of the Site;

- the contingent installation of a ground water pumping system;

- the contingent installation of a ground water filtration system;

- the contingent installation of a Granular Activated Carbon (GAC)Treatment system;

- the contingent installation of a treated effluent discharge system;

- the transportation and disposal of the GAC and filtration waste to a TSCA-compliant landfill or incinerator, if treatment is warranted; and

- long-term management controls including operation and maintenance of the ground water treatment system if warranted.

Items 1 through 3 will be immediately implemented. The implementation of items 4 through 10 of this alternative would be contingent upon confirmation of PCBs at downgradient compliance monitoring wells. Confirmatory sampling must occur within sixty days of receipt of the original monitoring results that show elevated PCB concentrations.

The initial total present worth cost for the selected remedy as presented in the Feasibility Study is $376,754. If the contingency is fullyimplemented, the total present worth cost will be $1,346,725. After further consideration of comments received during the public comment period, two additional monitoring wells were deemed necessary, thus increasing the total present worth cost by $30,875, for a total present worth cost of $407,629 for initial implementation and $1,377,600 for full implementation, if warranted.

STATUTORY DETERMINATION

The selected remedy is protective of human health and the environment, is cost effective, and it complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action or a waiver can be justified for whatever Federal or State applicable or relevant and appropriate requirement that will not be met. A waiver of the Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) for PCBs is required for the ground water located directly beneath and in close proximity to the former operational area. Justification for the waiver is the technical impracticability of utilizing a pump and treat system to remove PCBs from the ground water [40 C.F.R. 300.430(f)(1)(ii)(C)(3)]. This waiver applies solely to the ground water beneath the source area and will remain in effect until such time as active remedial measures may provide some advantage in attaining the ARAR. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this site. However, because treatment of the principal threats at the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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Yellow Water Road Site

Baldwin, Duval County, Florida

1.0 Site Name, Location, and Description

The Yellow Water Road site is located off Yellow Water Road (Florida State Road 217) approximately one mile south of Baldwin, Duval County, Florida (see Figure 1.1).

The site encompasses approximately 14 acres of predominantly vegetated land with limited topographical relief. Dense woods that can be viewed as a natural resource are located on the perimeter of the sites boundary. Surface elevations across the site generally do not vary more than one or two feet except for a few shallow man-made drainage ditches (see Figure 1.2).

The land adjacent to the site is used for many commercial purposes. Property owned by Florida Power & Light Company is located west of the site. Indian Head National Bank of Nashau owns property situated northwest, west, south, and southeast of the site. Property to the north is owned by Montgomery L. Broward, and property to the northeast is owned by Fred B. Miller, Jr. Some property to the east, across Yellow Water Road, is subdivided into residential plots bearing the name Village Green Subdivision. Interstate 10 is positioned north of the site, and Seaboard Coast Line Railroad owns property located to the northwest (see Figure 1.3).

The immediate on-site population is presently estimated to include five persons. An analysis of the population of the Traffic Analysis Zone (TAZ) in which the site is located shows an approximate surrounding population of 350 persons. It is estimated that the current population of this area will remain relatively constant until the year 2010.

Two residential buildings, consisting of a one-story family dwelling occupied by the Hyman family and a house trailer occupied by the Tyer, Jr. family, are located on the site. Also located on-site are assorted multipurpose outbuildings which include storage sheds, a pump enclosure and a carport. The only other permanent structure located on-site is a chain-link fence surrounding the former operational area which covers approximately three acres.

The dominant body of water nearest the site is the St. Johns River. Ground water flows from east to west across the site. There are no discharge areas on the site or immediately downgradient from the site.

2.0 Site History and Enforcement Activities

Prior to commercial development of the Site, the property was owned by Mr. Hardlee Spence, who used the land for dairy farming. In the late 1940's, the land was purchased by Mr. Robert C. Tyer for eventual commercial development.

Title to the property was transferred by Mr. Tyer to the American Environmental Energy Corporation (AEEC) in January 1982. In October 1981, AEEC had entered into a joint venture with two other corporations, the American Electric Corporation (AEC) and the American Environmental Protection Corporation (AEPC), with the intent of moving an incinerator to the Site and obtaining a permit under the Toxic Substances Control Act (TSCA) to incinerate Polychlorinated Biphenyls (PCBs). The principal individuals involved in this joint venture were Mr. Tyer and Mr. Maxwell Cobb.

As part of this enterprise, beginning in 1981 or 1982, PCB contaminated liquids and equipment were stored at the Site. The incinerator permit was never obtained, and the PCB-contaminated materials continued to be stored on-site.

By October 1982, the joint venturers had parted ways, and AEEC and Mr. Tyer sued AEC and Mr. Cobb, obtaining a restraining order in December 1982, preventing Mr. Cobb from entering the Site boundaries. After barring Cobb and AEC's access to the Site, Tyer and AEEC salvaged valuable metals such as cooper from the transformer carcasses, spilling PCB liquids and causing soil contamination at the Site.

In 1982, a customer of AEC, Dickerson Asphalt Company, filed suit against the Department of Defense (DOD) under the Federal Tort Claims Act. The suit alleged that PCB liquids sent by DOD to AEC were sold to Dickerson through a third party as waste oil. The lawsuit and the conditions noted by EPA TSCA inspectors led EPA, in cooperation with the FBI, to begin a criminal investigation of the operations of AEC and Mr. Cobb. The investigation centered on a contract between AEC and DOD for disposal of PCB contaminated liquids, equipment, and materials.

At a criminal trial involving AEC's performance under the contract with DOD, the prosecution centered on 47 PCB transformers. AEC had reported to DOD that they had disposed of the transformers at TSCA approved facilities when they had instead placed them at the Yellow Water Road Site. Although the defendants were acquitted by a jury on these charges in May 1984, guilty pleas were entered by Mr. Cobb and AEC's vice-president, Michael Hamm, on two unrelated criminal charges uncovered during the course of the investigation.

In the fall of 1984, Duval County cited Mr. Tyer, as president of AEEC, for violations of local PCB storage ordinances. The County ordered Tyer to remove all PCBs and PCB contaminated items, to investigate the Site to determine the extent of contamination, and to determine the cleanup and monitoring activities which were needed. Tyer informed the County that he was financially unable to meet these demands, and EPA's Emergency Response and Control Section was called in to respond.

In November 1984, at the outset of the initial removal action conducted by EPA, the PCB contaminated materials stored at the Site included 719 electrical transformers and a large amount of PCB contaminated liquid. During this removal action, the transformers were drained, steam cleaned, and stored on-site, and approximately 100,000 gallons of PCB contaminated fluids were drained to secured, on-site holding tanks. Approximately 3,000 cubic yards of soil contaminated with PCBs were also excavated and stockpiled on a concrete pad.

EPA proposed to incinerate the PCB contaminated fluids and soil, and, in January 1985, the City of Jacksonville conditionally approved the incineration of this material, pending an amendment to a city ordinance which prohibited the incineration of PCBs within the city limits. However, the Baldwin community opposed on-site incineration and, in February 1985, the Jacksonville City Council rejected the incineration proposal.

In order to complete the removal action, EPA secured the Site by covering the stockpiled soil with a synthetic protective covering and locking the gate. At that time, the responsibility for overseeing the Site was temporarily transferred to the City of Jacksonville Department of Health, Welfare, and Bio-Environmental Services (BESD).

In March 1985, the Florida Department of Environmental Regulation (FDER) issued a notice to the various principals of AEC and AEEC based on the detection of trichloroethene (TCE) contamination in four drinking water wells located upgradient of the Site. This notice advised them that the site was in violation of state law and that a Contaminant Assessment Plan (CAP) and a Remedial Action Plan (RAP) must be developed and implemented to address the contamination of the site. Subsequent ground water assessments were conducted whichindicated that the ground water contamination, which was due to the presence of PCBs and not TCE, was limited to within the site boundaries.

On April 15, 1985, EPA completed a Hazard Ranking System (HRS) package for the Site. The aggregate HRS score derived for the Site was 30.26. This score was based primarily on the ground water exposure pathway.

On June 14, 1985, EPA Region IV issued an order under Section 106 of CERCLA to Mr. Tyer, ordering him to cease various site-related activities. This order restricted the removal, salvaging, cleaning or emptying of the transformers on-site without proper notification to the officials listed in the order.

The Yellow Water Road Site was proposed for the National Priorities List (NPL) in Update 4 on September 18, 1985 (50 F.R. 37950), and the Site was placed on the NPL on June 10, 1986. Ranked by its HRS score, the Site was listed 658th out of the 888 sites listed on the NPL in June 1986.

In March 1987, EPA sent notice and demand letters to 67 Potentially Responsible Parties (PRPs) identified as generators of the PCB-contaminated materials found at the Site. By May 1987, 53 of the 67 PRPs had joined together and formed the Yellow Water Road Steering Committee (the Steering Committee). Later that year, EPA and the YWR Steering Committee entered into an Administrative Order by Consent (AOC) to conduct a Remedial Investigation/ Feasibility Study (RI/FS).

In May 1988, EPA and the Steering Committee entered into an additional Administrative Order by Consent, under which the Steering Committee undertook an interim surface removal action at the Site under EPA oversight. This removal action was completed in July 1988. The removal activities included the demolition of an on-site warehouse, disposal of the resulting debris and the previously stockpiled contaminated soil, off-site incineration of 78,854 gallons of PCB containing liquids, disposal of 704 transformers, and disposal of 18,690 pounds of potential PCB capacitors. The PCB-contaminated soils were transported to Chemical Waste Management's permitted disposal facility located in Emelle, Alabama. The PCB-contaminated liquids were transported by rail to SCA in Chicago, Illinois, for incineration.

Conestoga-Rovers & Associates, acting on behalf of the Steering Committee, performed the RI/FS field work, again under EPA oversight. These field activities were conducted at the Site from November 1988 to March 1990. Soil and sediment samples were collected and 18 groundwater monitoring wells were installed and sampled. The resulting RI and FS Reports were submitted and approved by EPA in April and August 1990, respectively. Based on these documents, EPA determined that additional data was needed to fully evaluate the extent of ground water contamination; and as a result, EPA separated the cleanup into two Operable Units, one for soils and sediments and one for ground water. EPA proposed a cleanup plan for Operable Unit One (OU1) (soils and sediments) in August 1990 and selected the remedy in September 1990. The Steering Committee is presently performing the Remedial Design for the remedy for OU1.

Concurrent with the release of the OU1 Record of Decision (ROD), the Steering Committee began additional OU2 (ground water) field work. The additional OU2 field work was conducted in two separate phases in January and October 1991. Activities included installation and sampling of six (6) additional ground water monitoring wells, sampling of surface and vadose zone soils, and sampling of several existing monitoring wells. The resulting OU2 RI and FS Reports were submitted and approved by EPA in March and April 1992, respectively. EPA released the proposed Plan for OU2 to the public on May 7, 1992, commencing the 30 day comment period. Comments received from the public and the State have been incorporated into the Responsiveness Summary, which is found in Appendix A of this document. 3.0 Highlights of Community Participation

In accordance with CERCLA sections 113 and 117 requirements, a Community Relations Plan (CRP) for the Yellow Water Site was developed. This Community Relations Plan outlines citizen involvement and the community's concern.

The most active period of community involvement with the Yellow Water Road Site occurred during 1984/1985 when EPA proposed to bring a portable incinerator on-site to burn PCB-contaminated materials stockpiled by EPA. Because of community opposition to on-site incineration, EPA decided against incineration as a viable alternative for remediating PCB-contaminated soils stockpiled within the former operational area of the site.

Media coverage for the Site has been sporadic since 1984. Minimal community involvement has occurred with regard to the site since 1985.

An RI Fact Sheet for the Yellow Water Road Site was issued to the public in December of 1988. All site-related documents were made available to the public in the information repository located in the Baldwin City Hall and at the EPA Records Center in Region IV. Following the release of the RI/FS Fact Sheet, an availability session was held on Tuesday, May 29, 1990, from 7:00pm to 9:00pm at the Mamie Agnes Jones Elementary School. At this meeting, EPA officials provided an update on site-related activities in addition to answering questions from concerned Jacksonville citizens.

The public was provided an opportunity to comment on the remedial alternatives for OU1 from August 28, 1990 to September 27, 1990. In addition, a public meeting was held on September 4, 1990 in Baldwin, Florida to present to the community EPA's preferred alternative for OU1 source remediation. During the public meeting, the community was informed of the availability of a Technical Assistant Grant (TAG). A response to the comments received during the public comment period is included in the Responsiveness Summary, which canbe found in Appendix B of the OU1 Record of Decision.

The OU2 RI/FS Reports and Proposed Plan for the Site were released to the public for comment in May 1992. These two documents were made available to the public in both the administrative record and the information repository located in the Baldwin Town Hall. A public comment period was held from May 7, 1992 through June 6, 1992. In addition, a public meeting was held on May 18, 1992 to answer questions about problems at the Site and the ground water remedial alternatives under consideration. A response to each comment received during the comment period has been provided in the Responsiveness Summary, which is found in Appendix A of this Record of Decision.

This decision document presents the selected ground water remedial action for the Yellow Water Road Site, in Baldwin, Duval County, Florida, chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan (NCP). The decision for this Site is based on the administrative record.

4.0 Scope and Role of Operable Unit

As with many Superfund sites, the problems at the Yellow Water Road Site are complex. The initial Remedial Investigation (RI) identified the areas of soil contamination to be remediated but was not of sufficient scope to fully characterize the extent of ground water contamination. Additional data was required to determine if migration of PCB-contaminated ground water had occurred and to further evaluate treatment alternatives for the PCBcontaminated ground water. As a result, EPA decided to implement cleanup of the site in two operable units. Operable Unit One (OU1), which is addressed in the Record of Decision (ROD) dated September 28, 1990, eliminates the potential for direct exposure to the contaminated soils and sediments. Operable Unit Two (OU2) addresses the potential for direct consumption of contaminatedground water.

The second OU remedy authorized by this ROD addresses the contaminated ground water in the limestone unit (surficial aquifer). The principal threat posed to human health and the environment stems from the potential future ingestion of ground water from source area wells by local residents. Also, there is a threat of contaminant migration in both aquifers to areas located offsite.

This is the second and final planned remedial action for this site. The objectives for the remedy are to prevent the near-term and future exposure of human receptors to contaminated ground water both on and off-Site, and to monitor ground water in a manner that will verify the effectiveness of the selected remedy.

This ROD has been prepared to summarize the remedial alternative selection process and to present the selected remedial alternative for the second operable unit.

5.0 Summary of Site Characteristics

5.1 Geology

The Yellow Water Road Site is underlain by approximately 75 feet of unconsolidated sand, silt, and clay. These strata rest on an approximately 20-foot-thick layer of coquina limestone and calcareous sandstone. This unit is underlain by the Hawthorn Formation, a thick sequence of silty clay, clayey sand, and sandy limestone. Four stratigraphic units were encountered during the RI. These units are detailed, sequentially, as follows:

i) upper sand, 25 to 35 feet thick;

ii) clay, 5 to 15 feet thick;

iii) lower sand, 25 to 35 feet thick; and

iv) limestone, 10 to 20 feet thick.

The upper sand consists of light brown to brown, fine, silty sand and fine sand. Thin, discontinuous, sandy clay and clay layers are also present in this unit. The clay unit, from five to 15 feet thick, has a high plasticity and is inferred to be continuous across the site. Hydrometer analyses performed on this unit show that the clay contains from 25 to 47 percent silt and very fine sand. The lower sand consists of fine to medium sand and silty sand with gravelly and shelly sand layers. The lowermost unit encountered is a poorly indurated, medium to coarse coquina and brown, poorly cemented, fine to medium grained, calcareous sandstone. Figures 5.1.1 through 5.1.3 illustrate geologic cross sections at the Site.

5.2 Hydrogeology

The Yellow Water Road Site is underlain by two major aquifer systems, the shallow aquifer and the Floridan aquifer systems. These aquifers are separated by low permeability sections of the Hawthorn Formation.

The shallow aquifer system consists of sands, limestone, and shell beds. Water from the shallow aquifer is considered of adequate quality for domestic use. Recharge of the shallow aquifer is chiefly by rainfall. Small diameter wells in the sand unit yield between 10 to 25 gallons per minute (gpm). Wells in the limestone can yield as much as 80 gpm for two-inch wells.

At the Yellow Water Road Site, the shallow aquifer system consists of an upper sand and a lower sand and limestone unit (identified in the RI Report as the upper and lower water table units respectively). The upper water table unit is separated from the lower water table unit by a clay layer. Most water-supply wells in the Yellow Water Road area are approximately 80 to 150-feet deep and draw water from the lower water table unit of the shallow aquifer system.

Ground-water flow in both the upper sand and the lower sand and limestone unit of the shallow aquifer system is from east to west. The horizontal hydraulic gradient ranges from 0.001 to 0.0006. The gradient decreases to the west toward a swampy area on the west side of the Site. The ground-water velocity was calculated as 4.6 ft/year within the upper sand and 4.7 ft/year within the lower sand and limestone unit. There are no ground-water discharge areas on the Site or immediately downgradient from the Site.

The Floridan Aquifer is the major source of ground water in northeast Florida. The Floridan

Aquifer is recharged through sinkholes and by downward leakage from surface water bodies and the shallow aquifer where the aquitard is thin or absent. Based on available information and close examination, there are no sinkholes on or within the vicinity of the Yellow Water Road Site, and recharge to this aquifer through the overlying Hawthorn Formation is considered to be very low. Water yield from wells in the Floridan Aquifer varies depending on depth, artesian pressure, and transmissivity. However, wells two to six inches in diameter can yield as much as 500 gpm.

5.3 Sampling Results

Twenty-eight monitoring wells have been installed at the Site in both the upper sand and the lower sand and limestone unit to determine the extent of PCB contamination (Figure 5.3.1 illustrates well locations). Seven ground-water monitoring well nests (MW-1 - MW-7), comprised of three wells per nest, and individual monitoring well, MW-8A, were installed during the Operable Unit 1 (OU1) RI field work. Additional monitoring well nests MW-9 and MW10, consisting of two wells per nest, and individual monitoring well MW-8B were constructed and developed during the first phase of the Operable Unit 2 (OU2) field work. The final monitoring well, MW-11A, was constructed during the second and final phase of the OU2 field work.

Monitoring wells were constructed to depths that correspond with the three stratigraphic units located at the Site. These are as follows:

- Upper Sand Water Table Unit ("A" wells);
- Lower Sand Water Table Unit ("B" wells); and
- Limestone Unit ("C" wells).

Two rounds of ground water samples, Phases I and II, were collected during the initial OU1 RI field work from well nests

MW-1 to MW-6. A subsequent third and fourth round of samples, Phases III and IV, were collected in February and March 1990, respectively. Phase III and IV sampling was limited to downgradient and source area wells. Another sampling event took place during the first phase of OU2 RI field work in February 1991 in which selected existing and all newly installed monitoring wells were sampled. The final OU2 sampling event occurred in October 1991 and involved sampling of wells MW-6A, MW-7A, and the newly installed MW-11A. These last two sampling events were labeled the "Supplemental Groundwater Investigation Sampling Rounds" in the OU2 RI/FS Reports.

During sampling phases I through IV, the samples were analyzed for the complete Target Compound and Analyte Lists (TCL/TAL), which includes analysis for volatile organic compounds, base/neutrals (B/Ns), inorganic compounds and polychlorinated biphenyls (PCBs). A summary of contaminant prevalence within the ground water samples of Phases I, II, III, and IV is presented in Table 5.3.1. Based on the results of the initial ground-water sampling rounds, EPA was able to determine the following:

1. No significant ground water VOC contamination exists at the Site;

2. No samples contained unqualified B/Ns above acceptable limits(as determined from Phase I monitoring results), thus B/Ns were omitted from subsequent monitoring;

3. No Inorganics were detected above acceptable levels (as determined from Phase I monitoring results); therefore, Inorganics were dismissed as chemicals of concern; and

4. PCBs were detected in the ground water during Phases I, II, III and IV and represent the

only chemical of concern at the Site (Ground water PCB concentrations found during all sampling rounds are shown in Figures 5.3.2 and 5.3.3).

The results of the Phase I through IV ground-water sampling events prompted EPA to initiate the OU2 Supplemental Groundwater Investigation in order to refine the vertical and areal limits of the PCB plume thought to exist at the Site. The ground-water samples obtained during this subsequent investigation were analyzed solely for PCBs since it was determined that no other chemicals posed a significant threat to ground water quality.

During the OU2 Supplemental Groundwater Investigation, it was determined that PCB contamination of the Upper Water Table Unit ("A" wells) is confined to a small "source" area located within Site boundaries. Monitoring data confirm that the Lower Water Table Unit has been marginally impacted by PCBs in the source area (contamination is limited to MW-6B and MW-7B). There is no indication of contaminant migration in the Lower Water Table Unit to areas adjacent to, or downgradient of, the source area. In fact, of all the wells sampled, PCBs were detected above the accepted federal Maximum Contaminant Level (MCL) of 0.5 parts permillion (ppb) on a consistent basis in only four monitoring wells, MW-6A, MW-6B, MW-7A and MW-7B. Figure 5.3.3 shows the PCB concentrations in these wells over all six ground-water monitoring rounds.

Based on the non-detect sampling results from the newest well, MW11A, which is located 20 feet downgradient of MW-6A, it was demonstrated that PCBs within the aquifer have not migrated downgradient from MW-6A. Consequently, this data, in conjunction with the filtered/unfiltered PCB analyses from the first sampling rounds, indicate that a continuous PCB plume is not present between MW-6A and MW-7A. The monitoring data demonstrate that PCB migration is being effectively attenuated, confining ground-water contamination to the source area.

6.0 Summary of Site Risks

6.1 Overall Risk Assessment Summary

The assessment of the risk posed by the Yellow Water Road Site was evaluated in a site specific risk assessment dated August 1990 (See Section 6.0 of the OU1 RI Report and Section 2.3 of the OU1 and OU2 FS Reports). This assessment, which was compiled prior to the 1989 guidance (EPA/540/1-89/002), examined the amount, concentration, properties, and environmental fate and transport of the PCBs found in the ground water at the Site, and the populations and environments potentially at risk. The risks associated with the Yellow Water Road site were calculated based on current and future exposure scenarios. The numerical cancer risk values are theoretical quantifications of the excess lifetime cancer risk, that is, the increased probability of contracting cancer as a result of exposure to site wastes, compared to the probability if no exposure occurred. For example, a 10^{-6} excess cancer risk represents an exposure that could result in one extra cancer case per million people exposed. The 10^{-6} risk level is considered the goal for remediation at Superfund sites under the National Contingency Plan, 40 CFR 300.430(e)(2)(i)(A)(2).

Though there are currently no complete exposure pathways, the predicted risk due to future ingestion of ground water (potential on-site residence) was 3.1×10^{-3}, which is unacceptable when compared to the upper boundary of the risk range (1×10^{-4}). However, ground water sampling indicates that the plume is currently limited to the former operations area within the Yellow Water Road property boundary. Also, the closest residential area is approximately one half mile northwest of the site and is hydrogeologically upgradient. Downgradient from the site there are no residential wells within a 1.5 mile radius area which are used to obtain water from the surficial or Floridan water bearing zones. Ground water modeling projections indicate that concentrations in the ground water will be below the limit of detection prior to reaching any off-site discharge points or receptors. Overall, the Remedial Investigation revealed that the

Site's ground water does not pose an imminent or future possible threat to off-Site residents.

6.1.1 Identification of Contaminants of Concern

In choosing the contaminants of concern for ground water, consideration is given to factors such as, "any available site background data, disposal history (and records, if available), types of remedial actions being considered, on site and off site chemical analysis data and site characterization data necessary for exposure assessment" (Chapter 3, "Superfund Public Health Evaluation Manual" EPA/540/1-86/060, OSWER Directive 9285.4-1, December 1989).

As indicated by the sampling results in Section 5.0, PCB compounds were found to be the primary contaminant of concern for ground water at the Site. All other contaminants discussed previously were discounted as contaminants of concern for various reasons (i.e., concentrations of contaminants that are similar to area/regional background concentration and thus are not considered site-related, concentrations that are of low prevalence/occurrence, or concentrations that are laboratory analysis related).

The Site's impacts on ground water were characterized using data from Phase III and Phase IV ground water sampling and analysis results. Of the ground water data in the two phases, data collected from Sectors 1 (area within the property fence) and 2 (area downgradient of Sector 1) were used to characterize the Site's risks. The exposure point concentrations used in characterizing the risks due to groundwater ingestion were 6.7 ug/L (Phase III: MW6), 14 ug/L (Phase IV: MW-6), 3.8 ug/L (Phase III: MW-7), 1.9 ug/L (Phase IV: MW-7), and 1.8 ug/L (Phase IV: MW-8). See Figures 5.3.2 and 5.3.3.

6.1.2 Fate and Transport Analysis

Site soils that are contaminated with PCBs will be remediated, thus removing the primary source for cross-medial PCB transport/contamination. However, a discussion of the fate and transport possibilities of site contaminants is useful in understanding the current site contaminant migration potential. Overland PCB transport processes are limited to surface water movement in and adjacent to the site. Surface drainage at the Site is generally from south to north. Due to the characteristic non-polar nature of most PCBs, they are relatively insoluble in water but readily adsorbed to most particulate matter. By analyzing the surface water and sediment PCB data, it is apparent that the predominant mode of overland PCB transport at Yellow Water Road is by sediment transport in conjunction with surface water flow. The sorptive nature of PCBs will hinder migration into ground water. Thus concentrations resulting from soil sources will not contribute to high PCB ground water concentrations.

6.2 Human Health Risks

6.2.1 Exposure Assessment Summary

An Exposure Assessment is an estimation of the magnitude,frequency, duration, and routes of exposure to humans. Exposure to the PCB contaminated ground water beneath the Yellow Water Road Superfund Site was evaluated based on current and future use scenarios. Based on the OU2 RI results, the only source of potential PCB exposure at the Site (including the adjacent landowners) is the surficial and Floridan aquifers beneath the site. Evaluation of all other media (soil, surface water, air) was addressed in the September 1990 Record of Decision.

In the original Risk Assessment, potential human exposures to Siterelated contaminants (PCBs) by two main pathways were evaluated. Potential points of exposure considered were inhalation or direct contact with surface soils and ingestion of contaminated ground water. The first exposure scenario was addressed in the OU1 ROD; therefore the following discussion will focus solely on the ground water pathway.

Under current land use conditions, no exposure to humans is occurring due to incomplete exposure pathways.

To address the future use scenario, conservative exposure assumptions were developed by EPA. In conducting the exposure assessment, the focus was on the health effects that could result from ingestion of PCB-contaminated ground water by an adult representing the highest potentially exposed receptor. The assessment was limited to long term daily exposure, since the Site's future plausible use is residential. The exposure assumptions included the ingestion of two liters of water per day, 365 days per year, for 70 years from a well currently containing the contaminant concentration described earlier herein. It is noteworthy to consider that as a result of dissipation and natural attenuation mechanisms, PCB levels in site wells have declined.

Considering both the present time and the future, the only complete ground water exposure pathway for the Yellow Water Road Site is the future residential ingestion scenario.

6.2.2 Toxicity Assessment Summary

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help to ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

PCB exposure can result in mild reversible injuries to skin and organ systems, while higher concentrations can result in carcinogenesis. Noncarcinogenic toxicity includes irritations to the skin, nose, and lungs, which was documented when workers were exposed to PCBs. Developmentally, young children of women who eat foods that contain high levels of PCBs, such as fish, before and during their pregnancy, might have trouble learning. EPA has not established an oral RfD nor inhalation RfD for any of the PCBs.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)[-1], are multiplied by the estimated intake of a potential carcinogen in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPFs. Use of this approach makes underestimation of the actual cancer risks highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

From a carcinogenic standpoint, there is adequate evidence for the PCBs to be classified B2 "Probable Human Carcinogen". This classification indicates that there exists evidence of carcinogenicity in animals and inadequate but suggestive evidence of cancer in humans by ingestion and inhalation or dermal contact. The EPA oral CPF for PCBs is 7.7 X 10[-0]. Numerous studies support this finding. Based on the animal toxicological studies, PCBs in the diet were found to induce liver tumors. Occupational exposures have induced melanoma cancers as reported when a small group of male exposed workers in a capacitor manufacturing plant showed an excess of all cancers. Primarily, the excess was manifested in the digestive system and the lymphatic tissues.

6.2.3 Risk Characterization Summary

Potential human exposure to site-related contaminants (PCBs) was evaluated via the ground water ingestion pathway. Potential ground water exposure was estimated as a future scenario using the conservative assumptions of site development and exposures in the absence of further remedial measures.

Excess lifetime cancer risks are determined by multiplying the intake level by the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10[-6] or 1E-6). An excess lifetime cancer risk of 1 x 10[-6] indicates that as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at a site. The Agency considers individual excess cancer risks in the range of 10[-4] to 10[-6] as protective; however, the10[-6] risk level is generally used as the point of departure for setting cleanup levels at Superfund sites. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the Hgs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Residential development of the on-site secure area as well as downgradient areas was found to pose unacceptable additional lifetime cancer risks. For off-Site development, the risk due to ingestion of ground water from MW-7 in Phases III and IV were 8.4 x 10[-4] and 4.2 x 10[-4] respectively. Similarly, Phase IV sampling of MW-8 showed an overall risk of 4.0 x 10[-4]. Currently, the downgradient wells do not exhibit PCB contamination. MW-6, which was located in the on-site fenced area, revealed risks of 1.5 x 10[-3] and 3.1 x 10[-3] as calculated from Phases III and IV PCB concentrations respectively.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare,
or the environment.

6.3 Environmental Risks

The Risk Assessment also surveyed and assessed the Site's effects on the environment. The site area is composed of mixed vegetation ranging from grassland and marshy areas to densely treed regions. As previously outlined, PCBs are the primary contaminant of concern for Yellow Water Road. Also, the ground water medium is the only medium of concern in this ROD, aspreviously stated.

Currently, there have not been any detectable Site-associated effects on biolife in the vicinity of the site. One primary pathway for ground water exposure would involve discharges into wetlands. Numerous wetland areas are present to the north (600 feet), west (2000 feet), and east (800 feet). Ground water discharge to these wetlands occurs in the area. Ground water migration is to the west at a velocity of approximately 4.6 to 4.7 feet per year. PCB migration with ground water is estimated to be a fraction of a foot per year thus migration of the low on-Site concentrations to off-Site wetland areas would take 4,800 years. Such migration would be contingent upon the presence of a substantial source in excess of all detected concentrations.

Future potential ground water associated exposure might involve human exposure pathways that can also be applied to terrestrial animal populations. Thus human activity must occur in order to make ground water available for consumption (i.e., watering lawns with contaminated ground water, filling bird baths, etc.). Due to the lipophilic properties of PCBs, mammals and insects would readily absorb PCBs directly through the skin or cuticle. Thus, such a onsite residential-based approach predicts that PCB bioaccumulation would occur with appropriate human intervention.

Generally, investigations have shown that PCBs interfere with reproduction in phytoplankters. Other observed effects in mammals and birds include microsomal enzyme induction, porphyrogenic action, tumor promotion, estrogenic activity, and immunosuppression. Other adverse effects are possible since the PCBs are lipophilic, a property, along with their stability, that leads to bioaccumulation and the possibility of long-term effects that have not been completely identified.

There are numerous endangered or threatened species associated with the Site's county as seen in Table 6.3.1. However none of these are currently believed to have habitats on-Site. There are also no known critical habitats associated with the Site area.

Overall, there are no complete pathways for exposure of critical species to site-related ground water sources.

Table 6.3.1

Endangered and/or Threatened Species for Duval County Florida

Mammals:

Florida Panther (Felis concolor) Endangered

Birds:

Bald Eagle (Haliaeetus leucocephalus) Endangered
Arctic Peregrine Falcon (Falco peregrinus) Threatened
Bachman's Warbler (Vermivora bachmanii) Endangered
Ivory-billed Woodpecker (Campephilus principalis) Endangered
Red-cockaded Woodpecker (Picoides borealis) Endangered

Reptiles:

Eastern Indigo Snake (Drymarchon corais) Threatened

7.0 Description of Ground Water Remedial Alternatives

The OU2 Feasibility Study report presents the results of a detailed analysis conducted on five potential ground water remedial action alternatives for the Yellow Water Road Site. This section of the Record of Decision presents a summary of each of the five alternatives that are described in the FS report.

Alternative 1 - No Action
Alternative 2 - Institutional Controls and Monitoring

Alternative 3 - Filtration/Carbon Adsorption (GAC)
Alternative 4 - Filtration/UV Oxidation
Alternative 5 - Contingent Filtration/Carbon Adsorption (GAC)

7.1 Alternative 1 - No Action

The National Contingency Plan requires that the "no action" alternative be considered at every site. Under the "no action" alternative, EPA would take no further action at the site to control/monitor the migration ofground water contamination or to restrict access to ground water contamination. This alternative serves as a baseline with which other alternatives can be compared. PCBs are stable in the environment and only slow degradation would be expected due to natural causes. Additionally, PCBs naturally tend to sorb to soil particles with limited mobility in a ground water environment.

Ground water PCB concentrations range from below detection limit to 29.4 ug/L. The corresponding additional cancer risk associated with these concentrations is above the guideline risk range of 10^{-4} to 10^{-6} within and in close proximity to the former operational area. However, as discussed in Subsection 2.2.5.2 of the FS Report, using the velocity calculated for aqueous PCBs (considering adsorption and advection) of 3.3×10^{-3} ft/year, the time required for PCBs to migrate to the nearest downgradient receptor would be in excess of 100,000 years.

This alternative will not comply with the preference for treatment pursuant to SARA; however, through natural processes, such as dispersion and attenuation, it would eventually achieve compliance with federal MCLs over a period of time that is in excess of 1,000 years. This alternative will not prevent the potential migration of PCBs off-site via sediment transport or leaching of PCBs into the upper and lower water table units. In fact, this alternative will allow for the continued risk of exposure to contaminated ground water should someone install a potable water supply well directly in the source area.

Since no action is required, this alternative is easily implemented with no associated costs.

7.2 Alternative 2 - Institutional Controls and Monitoring

This alternative includes the implementation of institutional controls and the initiation of a long-term ground water monitoring program to prevent exposure of human health and the environment to PCB-contaminated ground water. As with the no action alternative, this alternative relies on natural attenuation processes such as dispersion for the reduction of PCB concentrations in the ground water. In addition, this alternative involves the construction of two additional ground water monitoring wells (MW-12A and MW-12B) downgradient of the source area and the construction of a security fence encircling all source wells to ensure restricted access to the public.

The three readily available methods that will be used for restricting access to contaminated ground water are:

- deed restrictions;
- zoning controls; and
- water supply well permitting prohibitions.

A deed restriction is a negotiated addendum to an existing deed which, until removed, indicates that the ground water resource below the property is not considered safe for potable or other uses. This notifies the existing property owner and any subsequent owners of the ground water condition during the time that the aquifer is not usable.

Currently, Duval County has indicated that zoning ordinances are in effect in the vicinity of the Yellow Water Road site. These ordinances restrict the development of housing and ground water withdrawals by potential ground water users in the area using the zoning controls. Additionally, there currently exists a formal well permitting process for the installation of all potable water wells within the jurisdiction of the City of Jacksonville's Department of Health, Welfare, and Bio-Environmental Services (BESD), in which the Yellow Water Road Site is located. Also, the St. John's River Water Management District requires a well permit under certain conditions: If the well is equal to or greater than six inches in diameter, and if the well is to serve more than one household. At present, there are no existing water supplywells within one mile downgradient from the Site.

Further controls are in place to prevent the installation of potable water wells in areas of known contamination. According to Florida State Regulation 17-524, as set out in the Florida Administrative Code, Chapter 17 -524, the installation of any potable water well into contaminated aquifers is prohibited. These institutional controls can be readily implemented and coordinated through BESD and the St. John's River Water Management District. The imposition of institutional controls would be through a Site custodian, deed restrictions, and either of the two identified local agencies. These controls would have to remain in effect until PCB ground water concentrations declined to acceptable levels, which EPA estimates is in excess of 1,000 years.

In addition to the institutional controls, this alternative includes the initiation of a long-term ground water monitoring program to monitor the PCB concentrations in the ground water beneath and in close proximity to the Site. The ground water monitoring program will consist of annual monitoring of source area wells (Monitoring well nests MW-6, MW-7, and MW-8) and at least one upgradient well (MW-1A). In addition, future point of compliance (POC) wells (MW-9 cluster and the newly installed MW-12 cluster) would be sampled quarterly. This monitoring frequency will be maintained for a period of two years. After this two-year period, EPA will evaluate the monitoring results, possibly reducing the monitoring frequency to semi-annual. After EPA's five-year review, if historical data indicates stable or Non-Detect PCB concentrations, EPA will evaluate the use of an even less frequent monitoring schedule (annual) for these POC well nests. All collected ground water samples will be analyzed for PCBs.

This alternative is administratively feasible. The required equipment, labor and material are readily available. The estimated timeframe to complete the construction of the additional monitoring wells is one week.

This alternative will not comply with the treatment preference stated in SARA, but would represent a remedy through which eventual compliance with federal MCLs will be achieved over a period of time in excess of 1,000 years. This alternative will eventually be compliant with all existing chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs), as detailed in Table 8.2.1, due to the natural processes (dispersion and attenuation) that will serve to decrease ground water PCB concentrations with time. Alternative 2 will meet the requirements of all action-specific and location-specific ARARs, as applicable (See Table 8.2.1).

The anticipated capital costs for this alternative would be $30,875, with a present worth long-term O&M cost of $345,870. The estimated total cost would be $376,745. It is noted that for purposes of comparability and practicality, capital and present worth costs were based on the installation of two additional monitoring wells. The actual number and placement of any additional wells to be installed will be determined during Remedial Design. If EPA determines that more than the two wells specified above will be needed, the cost will increase accordingly.

Also, the present worth costs were estimated for a 30-year period; monitoring would need to be maintained for in excess of 1,000 years to attain a 0.5 ppb cleanup level naturally.

7.3 Alternative 3 - Filtration/Carbon Adsorption (GAC)

Major Components of Remedial Alternative:

This alternative utilizes a ground water extraction system with extracted ground water being treated by filtration and granular activated carbon (GAC). It is estimated that a filtration system would remove 70-90 percent of the suspended solids from the extracted ground water. The removal of PCBs will occur in a parallel fashion with removal of suspended solids and sediments. Any remaining adsorbed PCBs and the low fraction of dissolved PCBs will be removed through the final polishing by a GAC.

The major components of this alternative include:

a) the implementation of institutional controls as described under Alternative 2;

b) the construction of two additional ground water monitoring wells (MW-12A and MW-12B) downgradient of the former operational area;

c) the installation of a security fence around all source area wells (Monitoring well nests MW-6, MW-7, and MW-8);

d) the design and construction of ground water extraction wells in both the Upper and Lower Sand Units, located near the western boundary of the former operational area of the Site;

e) the installation of a ground water pumping system;

f) the installation of a ground water filtration system;

g) the installation of a GAC treatment system;

h) the installation of a treated effluent discharge system;

i) the transportation and disposal of the GAC and filtration waste to a TSCA-compliant landfill or incinerator on an as-required basis; and

j) the implementation of a long-term ground water monitoring program, as described under Alternative 2, to verify the effectiveness of the selected remedy.

Management of Residuals:

The residual filtrate and GAC waste generated from the treatment system will be transported for disposal to a TSCA-compliant landfill or incinerator on an as-required basis. A comprehensive off-Site Emergency Contingency Plan (as part of a properly enforced Site Health and Safety Plan) will address the potential risks associated with the accidental release of these wastes during off-Site transportation.

If treated ground water were discharged off-Site in this alternative, state and federal laws require that a National Pollutant Discharge Elimination System (NPDES) permit be acquired to ensure discharged effluent meets all necessary criteria. Consequently, effluent samples would need to be collected on a monthly basis for the duration of the treatment program. It is noted that, under the NPDES program, monitoring would not be limited to the Site-specific chemicals of concern, but would include additional parameters unrelated to the Site's history, which are found on EPA's Target Compound and Analyte (TCL/TAL) lists.

An alternative method of effluent discharge would be through an infiltration pond located on-Site to collect treated ground water. Specific permitting requirements exist for construction and maintenance of an infiltration pond; however, the treated effluent must meet only the substantive requirements of an NPDES permit for the Site-specific chemicals of concern.

Should the treated effluent be discharged directly to existing drainage swales, a sediment sampling program would be undertaken to monitor PCB concentrations which may accumulate over time in the environmental media. Since treated ground water would be discharged to the main drainage swale running parallel to the Site access road (and considered on-Site discharge), sediment samples would be collected on an annual basis for the duration of site remediation activities and monitored to ensure total PCB concentrations did not exceed a level of 50 ppb. In the event that sediment PCB concentrations exceed 50 ppb, these materials would be removed and, dependent on conditions existing at that time, new or alternative methods for treated effluent discharge would be evaluated by EPA.

The actual method for discharge of the treated effluent will be evaluated and selected during the Remedial Design. Summary of Remedial Alternative Evaluation:

This alternative is a demonstrated technology for the removal of PCBs from ground water. It can be relatively expensive if the GAC is regularly "spent," that is, the carbon has reached the breakthrough point where the PCBs no longer adsorb to the surface of the GAC. The use of a filtration system prior to passing through the GAC system will increase the life of the system and will reduce the amount of exhausted carbon that would require off -Site disposal.

The estimated time frame for implementation of this alternative (construction of treatment system) is eight to twelve weeks. This alternative is both technically and administratively feasible. The requisite equipment, labor, and materials are readily available.

This alternative will eventually lead to compliance with chemicalspecific ARARs (federal MCL for PCBs is 0.5 ppb); however, due to the high affinity of PCBs for the Site geologic media and the demonstrated low mobility of PCBs, these ARARs will not be achieved in the foreseeable future. Alternative 3 will meet the requirements of all action-specific and location -specific ARARs (See Table 8.2.1), as applicable, and will incorporate treatment as a remedial component pursuant to SARA. This alternative protects human health and the environment by implementing institutional controls and ground water monitoring.

The anticipated capital cost for this alternative as presented in the Feasibility Study is $425,750, with a present worth long-term O&M cost of $920,975. The estimated total cost is $1,346,725. It is noted that for purposes of comparability and practicality, capital and present worth costs were based on two additional monitoring wells and two extraction wells. The actual number and placement of any additional well installations will be determined during Remedial Design. If EPA determines that more than the four wells specified above will be needed, the cost will increase accordingly. Also, the present worth costs were estimated for a 30-year period; treatment will need to be maintained for in excess of 1,000 years to attain a 0.5 ppb cleanup level.

7.4 Alternative 4 - Filtration/UV Oxidation

Major Components of Remedial Alternative:

This alternative processes the extracted ground water through a filtration system and a

Ultra-Violet (UV) Oxidation system where the PCBs would be dechlorinated using a strong oxidizer and a UV light. As with Alternative 3, the filtration system would remove 70-90 percent of the suspended solids in the extracted ground water and the adsorbed PCBs in ground water prior to treatment by the UV Oxidation system. Any remaining adsorbed PCBs and the low fraction of dissolved PCBs will be removed through the final polishing by UV Oxidation. As with Alternative 3, this alternative will require in excess of 1,000 years of operation to attain the 0.5 ppb federal MCL, the cleanup level established for the Site.

The major components of this alternative include:

a) the implementation of institutional controls as described under Alternative 2;

b) the construction of two additional ground water monitoring wells (MW-12A and MW-12B) downgradient of the former operational area;

c) the installation of a security fence around all source area wells (Monitoring well nests MW-6, MW-7, and MW-8);

d) the design and construction of ground water extraction wells in both the Upper and Lower Sand Units, located near the western boundary of the former operational area of the Site;

e) the installation of a ground water pumping system;

f) the installation of a ground water filtration system;

g) the installation of a UV Oxidation treatment system;

h) the installation of a treated effluent discharge system;

i) the transportation and disposal of the filtration waste to a TSCA-compliant facility on an as-required basis; and

j) the implementation of a long-term ground water monitoring program, as described under Alternative 2, to verify the effectiveness of the selected remedy.

Management of Residuals:

The residual filtrate generated from the treatment system will be transported for disposal to a TSCA-compliant facility on an as-required basis. A comprehensive off-Site Emergency Contingency Plan (as part of a properly enforced Site Health and Safety Plan) will address the potential risks associated with the accidental release of these wastes during off Site transportation.

This alternative will require proper disposal of treated ground water as described for Alternative 3 in Section 7.3, Management of Residuals. If the treated effluent is discharged off-Site, an NPDES permit will be required. If the effluent is discharged on-Site to an infiltration pond or the existing drainage swale, only the substantive requirements of such a permit will have to be met. In addition, this alternative would require a sediment sampling program, as outlined for Alternative 3 in Section 7.3, should the treated effluent be discharged to the existing drainage swale. The actual method for discharge of the treated effluent will be evaluated and selected during the Remedial Design.

Summary of Remedial Alternative Evaluation:

This alternative is a demonstrated technology for the removal of PCBs from ground water. A high suspended solid content in the ground water will lower the efficiency of the UV Oxidation treatment system to remove PCBs. Thus, it is necessary to use a settling tank/filtration system prior to passing the ground water through the UV Oxidation treatment system.

The estimated time frame to complete construction of this alternative would be eight to twelve weeks. This alternative is both technically and administratively feasible. The requisite equipment, labor, and materials are readily available.

In obtaining ARARs, this alternative is identical to Alternative 3 in that it will eventually lead to compliance with chemical-specific ARARs (federal MCL for PCBs is 0.5 ppb); however, due to the high affinity of PCBs for the Site geologic media and the demonstrated low mobility of PCBs, these ARARs will not be achieved in the foreseeable future. Alternative 4 will meet the requirements of all action-specific and location-specific ARARs (See Table 8.2.1), as applicable, and will incorporate treatment as a remedial component pursuant to SARA. This alternative protects human health and the environment by implementing institutional controls and ground water monitoring.

The anticipated capital costs for this alternative would be $588,575, with a present worth long-term O&M cost of $1,054,996. The estimated total cost would be $1,643,571. It is noted that for purposes of comparability and practicality, capital and present worth costs were based on two additional monitoring wells and two extraction wells. The actual number and placement of any additional well installations will be determined during Remedial Design. If EPA determines that more than the four wells specified above will be needed, the cost will increase accordingly. Also, the present worth costs were estimated for a 30-year period; treatment will need to be maintained for in excess of 1,000 years to attain a 0.5 ppb cleanup level.

7.5 Alternative 5 - Contingent Filtration/Carbon Adsorption (GAC)

Major Components of Remedial Alternative:
This alternative utilizes institutional controls, long-term monitoring and construction of a ground water extraction system if PCBs at specified point of compliance (POC) wells are confirmed to exceed the federal MCL of 0.5 ppb. This alternative is identical to Alternative 3 with the exception of the contingency imposed on implementation of the treatment system. It is estimated that a filtration system would remove 70-90 percent of the suspended solids from the extracted ground water. The removal of PCBs would occur in a parallel fashion with removal of suspended solids and sediments. Any remaining adsorbed PCBs and the low fraction of dissolved PCBs would be removed through the final polishing by a GAC.

Initially, and perhaps ultimately, remedial activities for this alternative will include:

a) the imposition of institutional controls as described under Alternative 2;

b) the construction of two additional ground water monitoring wells (MW-12A and MW-12B) downgradient of the former operational area;

c) the installation of a security fence around all source area wells (Monitoring well nests MW-6, MW-7, and MW-8); and

d) the implementation of a long-term ground water monitoring program, as described in Alternative 2, to verify the effectiveness of the selected remedy.

If Alternative 5 were fully implemented, the additional remedial activities would include:

e) the design and construction of ground water extraction wells in both the Upper and Lower

Sand Units, located near the western boundary of the former operational area of the Site;

f) the installation of a ground water pumping system;

g) the installation of a ground water filtration system;

h) the installation of a GAC treatment system;

i) the installation of a treated effluent discharge system; and

j) the transportation and disposal of the GAC and filtration waste to a TSCA-compliant landfill or incinerator on an as-required basis.

The implementation of items e) through j) of this alternative would be contingent upon confirmation of PCBs at downgradient compliance monitoring wells. These point of compliance (POC) wells (MW-9A, 9B, and the newly installed wells, MW-12A and MW-12B) will be sampled quarterly for PCBs. Confirmatory sampling must occur within sixty days of receipt of the original monitoring results that show elevated PCB concentrations.

The monitoring frequency for these POC wells will be maintained for a period of two years. At the end of the two-year period, if historical data from the source area wells indicate PCB concentrations are stable or declining with time, EPA will consider a less frequent POC monitoring schedule (semiannual). After EPA's five-year review, and again if PCB concentrations in source area wells continue to be stable or decline, the monitoring frequency may be altered by EPA to allow only annual monitoring of POC wells. All collected ground water samples will be analyzed for PCBs. For evaluation and costing purposes only, it has been assumed that two additional monitoring wells will be installed under item b). The exact number and location will be evaluated and selected in the Remedial Design and the costs adjusted accordingly.

The long-term ground water monitoring program described under item d) will be identical to that described under Alternative 2, Section 7.2, consisting of annual monitoring of source area wells (Monitoring well nests MW-6, MW-7, and MW-8) and at least one upgradient well (MW-1A). All collected ground water samples will be analyzed for PCBs.

Management of Residuals:

If fully implemented, the residual filtrate and GAC waste generated from the treatment system would be transported for disposal to a TSCA compliant landfill or incinerator on an as-required basis. A comprehensive off-Site Emergency Contingency Plan (as part of a properly enforced Site Health and Safety Plan) would address the potential risks associated with the accidental release of these wastes during off-Site transportation.

If fully implemented, this alternative would require proper disposal of treated ground water as described for Alternative 3 in Section 7.3, Management of Residuals. If the treated effluent is discharged off-Site, an NPDES permit would be required. If the effluent is discharged on-Site to an infiltration pond or the existing drainage swales, only the substantive requirements of such a permit would have to be met. In addition, this alternative would require a sediment sampling program, as outlined for Alternative 3 in Section 7.3, should the treated effluent be discharged to the existing drainage swales. The actual method for discharge of the treated effluent would be evaluated and selected during the Remedial Design, if warranted.

Summary of Remedial Alternative Evaluation:

This alternative, if fully implemented, is a demonstrated technology for the removal of PCBs from ground water. It can be relatively expensive if the GAC is regularly "spent", that is, the carbon has reached the breakthrough point where the PCBs no longer adsorb to the surface of the GAC. The use of a filtration system prior to passing through the GAC system will increase the life of the system and will reduce the amount of exhausted carbon that would require off-Site disposal.

The estimated time frame for implementation of the first phase of this remedy (construction of monitoring system) is one week. If phase two is to be initiated, an additional seven to eleven weeks would be required for construction of the ground water treatment system. This alternative is both technically and administratively feasible. The requisite equipment, labor, and materials are readily available.

This alternative will eventually lead to compliance with chemical specific ARARs (federal MCL for PCBs is 0.5 ppb); however, due to the high affinity of PCBs for the Site geologic media and the demonstrated low mobility of PCBs, these ARARs will not be achieved in the foreseeable future. It is noted that initiation of phase two of this remedy, the active ground water treatment, would only have a marginal effect on cleanup of the Surficial Aquifer System and, as described under Alternative 3, would take in excess of 1,000 years of operation to eventually achieve cleanup goals. Under this scenario, the initiation of the treatment system would be for containment purposes only.

Alternative 5 meets the requirements of all action-specific and location-specific ARARs (See Table 8.2.1), as applicable, and, if fully implemented, would incorporate treatment as a remedial component pursuant to SARA. This alternative protects human health and the environment by implementing institutional controls and ground water monitoring.

The initial, and perhaps only, anticipated capital costs for this alternative would be $30,875, with a present worth long-term O&M cost of $345,870. The initial estimated total cost would be $376,745. If the alternative were fully implemented, the additional capitol costs and O & M costs would be $394,875 and $575,105, respectively. It is noted that for purposes of comparability and practicality, capital and present worth costs were based on two additional monitoring wells and two extraction wells. The actual number and placement of any additional wells to be installed will be determined during Remedial Design. If EPA determines that more than the four wells specified above are necessary, the cost will increase accordingly. Also, the present worth costs were estimated for a 30-year period; treatment would need to bemaintained for in excess of 1,000 years to attain a 0.5 ppb cleanup level.

8.0 Comparative Analysis of Ground Water Remedial Alternatives

A detailed comparative analysis was performed on the five (5) ground water remedial alternatives developed during the FS and the modifications submitted during the public comment period using the nine evaluation criteria set forth in the NCP. The advantages and disadvantages of each alternative were compared to identify the alternative with the best balance among these nine criteria. A glossary of the evaluation criteria is provided in Table 8.1. According to the NCP, the first 2 criteria are labeled "Threshold Criteria", relating to statutory requirements that each alternative must satisfy in order to be eligible for selection. The next 5 criteria are labeled "Primary Balancing Criteria", which are technical criteria upon which the detailed analysis is primarily based. The final 2 criteria are known as "Modifying Criteria", assessing the public's and State agency's acceptance of the alternative. Based on these final 2 criteria, EPA may modify aspects of the specific alternative.

A summary of the relative performance of each alternative with respect to the nine evaluation criteria is provided in the following subsections. A comparison is made between each of the alternatives for achievement of a specific criterion.

8.1 Overall Protection of Human Health and the Environment

This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how risks are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

PCBs, which have the consistency of heavy oil to wax at room temperature, are bound to geologic matter at the Site in a separate phase from the ground water and can most likely not be extracted from the aquifer in significant quantities at this time. It is for this reason that it is most likely technically infeasible to remove PCB contamination to levels that are protective of human health and the environment in the foreseeable Table 8.1

GLOSSARY OF EVALUATION CRITERIA

THRESHOLD CRITERIA:

Overall Protection of Human Health and the Environment - addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

Compliance with ARARs - addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and/or provides grounds for invoking a waiver.

PRIMARY BALANCING CRITERIA:

Long-Term Effectiveness and Permanence - refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of Toxicity, Mobility, or Volume Through Treatment addresses the anticipated performance of the treatment technologies that may be employed in a remedy.

Short-Term Effectiveness - refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Implementability - is the technical and administrative feasibility of a remedy, including the availability of materials and services needed toimplement the chosen solution.

Cost - includes capital and operation and maintenance costs.

MODIFYING CRITERIA:

State Acceptance - indicates whether the State concurs with, opposes, or has no comment on the Proposed Plan.

Community Acceptance - the Responsiveness Summary in the appendix of the Record of Decision reviews the public comments received from the Proposed Plan public meeting and the public comment period. future. None of the remedies evaluated will in all probability eliminate the risks due to PCBs in the ground water.

All of the alternatives, with the exception of the "No Action" alternative, would provide protection of human health and the environment by restricting exposure to contaminated ground water through institutional controls and a ground water monitoring program. These controls would have to remain in effect until PCB ground water concentrations declined to acceptable levels.

Alternatives 3, 4 and 5 will prevent the migration of PCB contaminated ground water away from the source area, yet their active operation will produce contaminated waste by-products that will require staging, transport and disposal, or treatment. While Alternatives 3, 4 and 5 employ treatment as a remedial component, the affinity of PCBs for solid material coupled with the hydrogeologic characteristics of the Site renders treatment for complete PCB removal ineffective. The extraction/treatment systems would be utilized as a means by which the PCB-contaminated ground water can be contained. Remediation of the ground water to acceptable health based levels would not be achieved in the foreseeable future (less than 1,000 years).

The No Action alternative fails to provide any controls to restrict exposure to the contaminated ground water. Alternatives 2, 3, 4, and 5 rely on institutional controls and monitoring for protection of human health and the environment until contaminant levels naturally dissipate to levels below the MCL.

Thus, all factors considered, Alternatives 2, 3, 4 and 5 are equally protective and slightly better than Alternative 1 since they each have access restrictions and monitoring components.

8.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This criterion addresses whether or not an alternative will meet all ARARs of other federal and state environmental statutes or provide a basis for invoking a waiver. Each alternative was evaluated for compliance with ARARs, including chemical-specific, action-specific, and location-specific ARARs. These ARARs are presented in Table 8.2.1. ARARs are broken down in the table into federal and state regulations.

Because of the infeasibility of removing sufficient amounts of PCBs from the aquifer for treatment, none of the alternatives are estimated to comply with the Safe Drinking Water Act (SDWA), 40 C.F.R. Part 141, Primary Drinking Water Standards for PCBs, for the ground water located directly beneath the source area (former operational area) within the foreseeable future. The Maximum Contaminant Level (MCL) set for PCBs, which is 0.5 ug/L or ppb, will most likely not be attained beneath the source area by any of the alternatives within a reasonable timeframe (less than 1,000 years).

EPA waives the requirements of 40 C.F.R. Part 141 for the ground water located beneath and in close proximity to the source area according to 40 C.F.R. 300.430(f)(1)(ii)(C)(3). This waiver applies solely to the ground water beneath the source area and will remain in effect until such time as active remedial measures provide some advantage to attaining the ARAR. Justification for the waiver is based on the fact that attainment of the MCL is technically impracticable for several reasons, including: (1) the sorptive nature of PCBs to geologic matter; (2) the limited area of ground water contamination that exists; (3) the lack of evidence supporting continued contaminant migration; and (4) the trend towards naturally decreasing PCB concentrations in the ground water. The benefit gained from immediate implementation of a pump and treat system for removal of PCBs from the ground water would be marginal at best due to the affinity for PCBs to Site geologic matter.

Alternatives 2, 3, 4 and 5 will attain their respective federal and state ARARs due to the implementation of institutional controls and restricted Site access. Both measures will ensure that there is no potential for future exposure to ground water containing PCB concentrations in excess of federal and state ARARs promulgated under the SDWA and Florida Drinking Water Standards, respectively. Alternatives 3, 4 and 5 ranked higher than the other two since they all have a treatment component pursuant to SARA.

8.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

Alternatives 3, 4 and 5 provide greater long-term effectiveness and permanence than the other two alternatives; however, the affinity of PCBs to naturally occurring solids predisposes any ground water extraction and treatment system to be only marginally successful. There would be some PCBs extracted with the filtered suspended solids; however, the effectiveness of these alternatives for ground water containment relative to natural processes would be marginal at best. In fact, as presented in the FS Report, contaminant migration models indicate that it would take approximately 1,000 years for the edge of a 0.5 ppb PCB plume to be observed only 40 feet from the Site source area.

Alternative 2 is more effective than Alternative 1 in the long-term due to the enforcement of institutional controls and the implementation of an active monitoring system. The No Action alternative was the least effective in achieving the long-term effectiveness and permanence criterion. No Action leaves the potential risk associated with the site ground water in an unaltered state.

8.4 Reduction of Toxicity, Mobility, or Volume

This is the anticipated performance of the treatment technologies an alternative may employ. The degree of reduction of toxicity, mobility or volume through treatment varies depending on the methods of ground water extraction and treatment employed.

As discussed previously, some PCBs would be extracted using a pump and treat system. Alternatives 3, 4 and 5 offer active reduction in mobility of PCB-contaminated ground water, resulting in a higher ranking than Alternatives 1 and 2 for this criterion.

Alternatives 3, 4 and 5 utilize filtration and final "polishing" as the treatment process for extracted ground water. Carbon Adsorption (GAC) is the final polishing system used in Alternatives 3 and 5, and UV Oxidation is utilized in Alternative 4. Alternatives 3, 4 and 5 would reduce the mobility of the PCBs by inducing inward or negative flow in the vicinity of the contamination, preventing the spread of contaminated ground water off-Site. However, again the effectiveness of Alternatives 3, 4 and 5 relative to Alternatives 1 and 2 is marginal due to the chemistry of PCBs andthe effectiveness of natural attenuation mechanisms.

Alternatives 1 and 2 are considered equivalent since there would be no active reduction in toxicity, mobility or volume of on-Site PCBs in ground water with these alternatives.

Reduction in toxicity and volume is at best marginal for Alternatives 3, 4 and 5 when compared to Alternatives 1 and 2.

8.5 Short-Term Effectiveness

This criterion refers to the period of time needed to completely achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup objectives are achieved. The following factors were used to evaluate the short-term effectiveness of each alternative: protection of the community during remedial actions, protection of workers during remedial actions, environmental impacts from implementation of alternatives, and the time until remedial action objectives are met.

With respect to protection of the community, the No Action alternative rates most favorably for this criterion since no construction activities would occur. However, it is least effective in reference to the time in which the remedy would achieve protection. Alternative 2 ranked second best only because of the potential inconvenience imposition of institutional controls may cause area residents.

The construction activities for Alternatives 3, 4 and possibly 5 would pose a minimal risk to the surrounding community; however, the ground water treatment systems utilized in Alternatives 3, 4 and possibly 5 will produce contaminated waste by-products that will require staging, transport and disposal, or treatment. Handling of these waste by-products may pose an additional risk to the community of off-Site transportation and potential spillage. In each alternative, the protection of Site personnel would be afforded by the use of appropriate safety equipment to be worn at all times while working in contaminated areas. A properly implemented health and safety program would also provide for additional protection of personnel.

Adverse impact to the environment would be negligible for each alternative. Environmental impact, if any, would arise from dust particulate emissions at the Site and any accidental releases during transportation of the waste by-products to the TSCA-compliant landfill. A properly implemented health and safety program would address air monitoring requirements on site and an off-site Emergency Contingency Plan would address any off-site release procedures.

Alternative 3 was the least effective alternative since it would generate the most amount of waste by-product that would require additional remediation.

8.6 Implementability

This is the technical and administrative feasibility of an alternative, including the availability of goods and services needed to implement the solution.

All the alternatives are both technically and administratively feasible; however, Alternative 1 (No Action) would require the least amount of effort and, therefore, is most effective for this criterion. This is followed by Alternative 2 which would only require some administrative requirements and implementation of monitoring. Alternative 5 would be easier to implement than Alternatives 3 and 4 since initially (and perhaps ultimately) only monitoring and institutional controls would be required. Alternatives 3 and 4 would be considered the least implementable due to the necessary extraction and treatment equipment required; although Alternative 3 is slightly more effective than Alternative 4 since the GAC treatment system may be amenable to assembly of pre-constructed and sized components.

8.7 Cost

The following alternatives were assessed on a total cost basis using the estimated capital cost to perform the remedial work and the present worth cost for operation and maintenance costs, using a five percent discounted rate over a 30-year period. Table 8.7.1 details the capital and O & M costs for the 5 ground water remedial alternatives. It is noted that for Alternatives 2 through 5, cost estimates were also based on the installation of two additional monitoring wells and two extraction wells, although additional wells may be required, as determined during Remedial Design. Also, it is noted that for Alternatives 3 through 5, cost estimates were based on a 30-year period, yet treatment would be required for a period in excess of 1,000 years.

Alternative 4 (Filtration/UV Oxidation) is the most expensive ground water remedial alternative at $1.6 million. The cost for Alternatives 3 and 5 (if fully implemented) are slightly less than the cost for Alternative 4 and offer a comparable degree of protection. Alternatives 2 and 5 (initially) are substantially less expensive than Alternatives 3 and 4, yet provide a comparable degree of protection because of the marginal benefit gained from actively remediating PCBs in ground water. Alternative 1 is the least costly and provides the least amount of protection.

8.8 State Acceptance

This indicates whether, based on review of the RI Report, FS Report, and Proposed Plan, the U.S. EPA and FDER agree on the preferred alternative. EPA and FDER are in agreement on the selected alternative.

8.9 Community Acceptance

This indicates the public's support of a given alternative. This criterion is addressed in the Responsiveness Summary, Appendix A of this document.

Based on comments made by citizens and government officials at the public meeting held on May 18, 1990, and those received during the public comment period, the Agency perceives that the community believes that the overall selected remedy of Contingent Filtration/Carbon Adsorption (GAC) for contaminated ground water will effectively protect human health and the environment.

9.0 Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of the remedial alternatives and public comments, EPA has selected Alternative 5 as the appropriate remedial alternative for ground water at the Yellow Water Road Site. Alternative 5 provides short and long-term protection of human health and the environment from potential threats associated with direct contact (ingestion) of the PCB-contaminated ground water, and provides for immediate initiation of active restoration/containment should the contaminated ground water migrate outside of the former operational area.

Initially, and perhaps ultimately, remedial activities for Alternative 5, as modified by the incorporation of comments received from the governing state agency, include the following:

a) the imposition of institutional controls as described under Alternative 2, Section 7.2;

b) the construction of four additional ground water monitoring wells downgradient of the former operational area, two wells (MW-13A and 13B) will be located 20 feet downgradient of MW-7 and two wells (MW-12A and 12B) located 20 feet downgradient of MW-8;

c) the installation of a security fence around all source area wells (Monitoring well nests MW-6, MW-7, and MW-8); and

d) the implementation of a long-term ground water monitoring program, as described in Alternative 2 and modified below, to verify the effectiveness of the selected remedy.

If Alternative 5 were fully implemented, the additional remedial activities would include:

e) the design and construction of ground water extraction wells in both the Upper and Lower Sand Units, located near the western boundary of the former operational area of the Site;

f) the installation of a ground water pumping system;

g) the installation of a ground water filtration system;

h) the installation of a GAC treatment system;

i) the installation of a treated effluent discharge system; and

j) the transportation and disposal of the GAC and filtration waste to a TSCA-compliant landfill or incinerator on an as-required basis.

The implementation of items e) through j) of this alternative would be contingent upon confirmation of PCBs at downgradient compliance monitoring wells. These point of compliance (POC) wells (MW-10A, 10B, and the four newly installed wells, MW-12 A, 12B, 13A, and 13B) will be sampled quarterly for PCBs. Confirmatory sampling must occur within sixty days of receipt of the original monitoring results that show PCB concentrations at or above the 0.5 ppb MCL.

The monitoring frequency for these POC wells will be maintained for a period of two years. At the end of the two-year period, if historical data from the source area wells indicate PCB concentrations are stable or declining with time, EPA will consider a less frequent POC monitoring schedule (semiannual). After EPA's five-year review, and again if PCB concentrations in source area wells continue to be stable or decline, the monitoring frequency may be altered by EPA to allow only annual monitoring of POC wells. All collected groundwater samples will be analyzed for PCBs.

The long-term ground water monitoring program described under item d) will consist of quarterly monitoring of source area wells (Monitoring well nests MW-6, MW-7, MW-8, MW-11) and at least one upgradient well nest (MW1). The monitoring frequency for these source area wells will be maintained for a period of two years. At the end of the two-year period, if historical data indicate PCB concentrations are stable or declining with time, EPA will consider a less frequent source area monitoring schedule (semi-annual). After EPA's five-year review, and again if PCB concentrations in source area wells continue to be stable or decline, the monitoring frequency may be altered by EPA to allow only annual monitoring of source area wells. All collected ground water samples will be analyzed for PCBs.

Due to the sorptive nature of PCBs, the geologic characteristics of the Site, the anticipated decrease in ground water PCB concentrations over time, the limited area of ground water contamination, and the lack of evidence supporting the concept of continued PCB-migration within the aquifer, EPA determined that the benefit of immediately implementing a conventional ground water pump and treat system at the Site would be marginal at best in comparison to the results obtained from the naturally occurring attenuation mechanisms such as dispersion.

At this time, implementation of a conventional pump and treat system would be for containment purposes only, due to the current technical impracticability of removing PCBs from ground water. As part of the remedy, should PCBs be confirmed in any of the designated Point of Compliance (POC) wells at or above the SDWA MCL of 0.5 ppb, a pump and treat system would be designed and implemented to ensure protection of human health and environment by eliminating the threat of PCB migration in the ground water. "Treatment" of the contaminated ground water would be accomplished by passing it through a treatment process similar to that shown in figures 9.1 and 9.2 and would extend beyond the points of compliance at the operational area boundaries, actively containing the contaminated ground water within Site boundaries. After being passed through a filtration system for removal of the suspended solids and adsorbed PCBs, the ground water would be passed through a series of carbon adsorption units, which contain granular activated carbon (GAC) and operate in a downward series mode, for removal of the remaining contaminants. Treated ground water would either be discharged to on-Site infiltration ponds or drainage swales, or to off-Site receptors. Should off-Site discharge be the chosen option, an

NPDES permit would be required.

Referring to Table 5.3.1, the Site-related contaminant of concern has a Maximum Contaminant Level (MCL) as promulgated under the Safe Drinking Water Act (40 C.F.R. 141,143). The MCL for PCBs is 0.5 ppb and will be used as the remediation level for the contaminant at and beyond the points of compliance to the Site boundaries. Pumping and treating would be utilized to contain the contamination, and therefore, would continue until the remediation level for PCBs (0.5 ppb) is achieved.

Initial construction activities for the implementation of the ground water monitoring program are estimated to be completed in one week. If the treatment phase is warranted, an additional 8 to 11 weeks will be required to complete the construction activities.

For purposes of comparability and practicality, capital and present worth costs were based on the installation of two

additional monitoring wells and two extraction wells. Table 9.1 details the cost analysis summary for Alternative 5 as presented in the Feasibility Study. After further consideration of comments received during the public comment period, two additional monitoring wells were deemed necessary, thus increasing the total present worth cost by $30,875, for a total present worth cost of $1,377,600. It is noted, that if EPA determines during remedial design that more than the four monitoring or two extraction wells specified above are necessary, the cost of the remedy will increase accordingly. Also, the present worth costs were estimated for a 30-year period; treatment, if implemented, would need to be maintained for in excess of 1,000 years to attain a 0.5 ppb cleanup level.

Long-term ground water operation and maintenance activities will include quarterly monitoring for a minimum of two years. At that time EPA will evaluate the feasibility of using a less frequent monitoring schedule for the duration of the long-term ground water monitoring program. Long-term operation and maintenance requirements are expected for the recommended alternative for this operable unit. Monitoring will determine the effectiveness of natural processes and the implemented contingent pump and treat system at reducing migration of PCBs in the ground water and potentially remediate ground water to meet the MCL. An Operation and Maintenance Plan will be developed during the Remedial Design/Remedial Action tasks.

Due to the strong binding nature of PCBs, it is technically impossible at this time to develop an alternative which will remove PCBs from the ground water to levels EPA deems acceptable in a reasonable amount of time. The selected contingent ground water extraction system would remove some of the PCBs in the aquifer; however, complete removal to health-based levels would not occur within the foreseeable future.

Design Considerations

To insure that the design of the system, if warranted by confirmation of PCB migration at the Site, is optimized, modifications may be considered prior to invoking contingency measures. Any or all of the below may be employed:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternative pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into ground water; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

e) an innovative ground water recovery system to enhance the recovery of PCB ground water.

Table 9.1

COST ANALYSIS SUMMARY
ALTERNATIVE 5
CONTINGENT FILTRATION/GAC
YELLOW WATER ROAD SITE, BALDWIN, FLORIDA

Item	Description	Estimated O & M Costs	Estimated Capital Cost	Total Cost
Summarized Costs				
Phase I - Monitoring Wells				
1.	Direct Capital and Contingency Costs	$ 0	$ 23,750	$23,750
2.	Indirect Capital Costs	0	7,125	7,125
3.	Operation and Maintenance Costs	345,870	0	345,870
	Subtotal: Phase I Costs	$ 345,870	$ 30,875	$376,745
Phase II - Contingent Groundwater Treatment				
1.	Direct Capital and Contingency Costs	0	303,750	303,750
2.	Indirect Capital Costs	0	91,125	91,125
3.	Operation and Maintenance Costs	575,105	0	575,105
	Subtotal: Phase II Costs	$ 575,105	$ 394,875	$969,980
	TOTAL COST	$ 920,975	$ 425,750	$1,346,725

Contingency Measures

Due to the hydrogeological characteristics of the Site and the chemical nature of PCBs, it has been determined that the portion of the surficial aquifer beneath the former operational area and the surrounding acreage incorporating the Site can not be restored through known conventional means to its beneficial use in the foreseeable future. Thus, all of the following measures involving long-term management may occur, for an indefinite period of time, as a modification to the selected remedy and/or the contingent treatment system:

a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as containment measures; and

b) periodic reevaluation of remedial technologies, including innovative technologies, for restoration of PCB-contaminated ground water.

The decision to invoke any or all of these measures may be made during periodic review of the remedial action, which will occur in accordance with CERCLA Section 121 (c), 42 U.S.C. 9621 (c), which specifies that a formal review be conducted at least every five years for sites with contaminants remaining above health-based levels. Additionally, reevaluation of possible groundwater remedial technologies will occur prior to implementation of the contingent pump and treat system. If any or all of these measures are determined to be appropriate, an Explanation of Significant Difference (ESD) or a ROD Amendment will be issued to document these measures and inform the public.

10.0 Statutory Determinations

Under its legal authority, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this Site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy must also be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes preference for remedies that employ treatments that permanently and significantly reduce the toxicity, mobility or volume of hazardous wastes as their principle element. The following sections discuss how the selected remedy for this Site meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy of contingent filtration/carbon adsorption of the ground water protects human health and the environment through the imposition of institutional controls and ground water monitoring. Restricted access to both the Site and the ground water below eliminates the threat of direct contact (ingestion) of the PCB-contaminated ground water to current and future landowners in the vicinity of the Site. Should PCB migration begin to occur, the contingent pump and treat system will be immediately implemented, eliminating the potential ingestion threats to downgradient receptors.

Implementation of Alternative 5 will not pose any unacceptable short-term risks or cross-media impacts to the Site, the workers, or the community that cannot be readily controlled. Should the contingent treatment system be implemented, potential risks associated with transportation of waste by-products and discharge of treated ground water off-Site will be minimized by following the respective Health & Safety and Discharge Permit Plans.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121 (d)(2)(A) of CERCLA incorporates into the law the CERCLA Compliance Policy, which specifies that Superfund remedial actions must meet any federal and state standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Also included is the provision that state ARARs must be met if they are more stringent than federal requirements.

ARARs for treating or managing PCB-contaminated material derive primarily from the Toxic Substances Control Act (TSCA) PCB regulations. The TSCA regulations of importance to Superfund actions are found in 40 CFR Section 761.60 - 761.79, Subpart D; Storage and Disposal. They specify treatment and disposal requirements for PCBs based on their form and concentration. TSCA does not however address liquid PCBs at concentrations less than 50 ppm, and therefore, does not apply to the ground water at the Yellow Water Road Site. The highest concentration detected in the ground water was 29.4 ppb from well cluster 6. Where PCBs affect groundwater, the Safe Drinking Water Act (SDWA) provides potential ARARs for establishing cleanup goals, i.e., Maximum Contaminant Levels (MCLs).

The recommended alternative was found to meet or exceed thefollowing ARARs selected from Table 8.2.1, as discussed below, or a waiver has been justified.

Chemical-Specific ARARs:

- Safe Drinking Water Act MCLs (40 CFR Part 141 and 143), a waiver is required for the ground water located directly beneath and in close proximity to the source area based on the technical impracticability of achieving the MCL in the foreseeable future.

- Florida (FLA) Drinking Water Standards (FDER 17-550)

Location-Specific ARARs:

- Endangered Species Act (50 CFR 402), which requires that federal agencies ensure that their actions do not jeopardize the continued existence of a threatened or endangered species.

Action-Specific ARARs:

- CERCLA/SARA (42 USC 9601 et. seq.), defines ARARs under 40 CFR 300.68 (NCP).

- Clean Water Act (40 CFR Part 122)

- Toxic Substances Control Act (TSCA) (15 USC 2605), which applies to transport and disposal of PCB wastes greater than 50 ppm, such as waste by-products from treatment systems.

- Spill Cleanup Policy (TSCA, 40 CFR 761, Subpart D, G, K), which applies to transportation and disposal of PCB wastes.

- Clean Air Act, which applies to air emissions from any on-site treatment alternatives.

- Worker Safety and Health Protection (OSHA)

- Hazardous Materials Regulations (49 CFR 170 to 179), which applies to transportation of hazardous materials or waste byproducts.

- FLA Solid and Hazardous Waste Management Act, whichapplies to the transportation and disposal of hazardous waste.

- FLA Hazardous Waste Rules (17-730 F.A.C.)

- FLA Water Quality Standards (17-3, Part IV)

- FLA Stormwater Discharge Regulations (17-25)

- FLA Drinking Water Standards (FDER 17-550), which applies to effluent from treatment systems.

- City of Jacksonville, Rules Regarding PCB Storage and Disposal, which applies to ground water treatment alternative discharges.

Other Criteria To Be Considered:

An agreement shall be reached in the future between EPA and the State and Local Authorities to prohibit construction of water supply wells on and in the vicinity of the Site. This will prevent direct contact or ingestion of contaminated ground water.

Additionally, the chosen alternative may include effluent discharge off-Site, and therefore, the requirements of an NPDES permit may apply.

10.3 Cost Effectiveness

This alternative affords a higher degree of overall effectiveness in not only protecting the public against direct exposure but in removing the threat of a future release of contaminants. The estimated capital cost of this alternative, if fully implemented, is $1.3 million (including operation and maintenance). Initial, and perhaps ultimate, present worth costs total $350,000.

The selected remedy affords overall effectiveness proportional to its cost, such that the remedy represents a reasonable value for the money. When the relationship between cost and overall effectiveness of the selected remedy is viewed in light of the relationship between cost and overall effectiveness afforded by the other alternatives, the selected remedy appears to be cost-effective. 10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

U.S. EPA has determined that this remedy is the most appropriate cleanup solution for remediating the ground water at the Yellow Water Road Site and that it provides the best balance among the evaluation criteria for remedial alternatives evaluated. This remedy provides effective protection in both the short and long-term to potential human and environmental receptors, is readily implemented, and is cost effective.

10.5 Preference for Treatment as a Principal Element

By monitoring Site contamination and restricting access to contaminated ground water, the selected remedy addresses the threat of future direct contact with, or ingestion of, PCB-contaminated ground water. Should PCB migration be observed, the contingent pump and treat system will be implemented to contain the contamination as well as to remove it for treatment. However, because treatment was not found to be practicable as a means for reducing PCB concentrations to health-based levels, this remedy does not satisfy the statutory preference for treatment as a principal element. The hydrogeologic characteristics of the Site coupled with the chemistry of PCBs preclude selecting a remedy in which reduction of PCBs to acceptable levels could be achieved in the foreseeable future. Implementation of the contingent pump and treat system would be undertaken solely as a means by which ground water contamination can be contained.

Because wastes will remain in the ground water above health-based levels, EPA will review the Site at least every five years. If, at the time of review, a new technology for treatment of PCBs in the groundwater is available and treatment is warranted, its implementability will be assessed at that time.

11.0 Documentation of Significant Changes

The Proposed Plan for the Yellow Water Road Site was released to the public on May 8, 1992. The Proposed Plan identified Alternative 5, Contingent Filtration/Carbon Adsorption (GAC), as the preferred alternative for ground water remediation. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

APPENDIX A

RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) established a public comment period from May 8, 1992 through June 7, 1992 for interested parties to comment on EPA's Proposed Remedial Action Plan (PRAP) for Operable Unit Two for the Yellow Water Road site. During the comment period, EPA conducted a public meeting on May 18, 1992 at the Mamie Agnes Jones Elementary School in Jacksonville, Florida. The meeting presented the results of the studies undertaken and the preferred remedial alternative for Operable Unit Two (ground water). During the public meeting the community was informed of the availability of a Technical Assistance Grant (TAG).

A responsiveness summary is required by Superfund policy to provide a summary of citizen comments and concerns about the site, as raised during the public comment period, and the responses to those comments and concerns. All comments summarized in this document have been factored into the final decision on the preferred alternative for Operable Unit Two at the Yellow Water Road Site.

This responsiveness summary for the Yellow Water Road Site is divided into the following sections.

I. Overview: This section discusses the recommended alternative for remedial action for Operable Unit Two and the public reaction to this alternative.

II. Background on Community Involvement and Concerns: This section provides a brief history of community interest and concerns regarding the Yellow Water Road Site.

III. Summary of Major Questions and Comments Received During the Public Comment Period and FDER's or EPA's Responses: This section presents both oral and written comments submitted during the public comment period, and provides the responses to these comments.

IV. Remaining Concerns: This section discusses community concerns that EPA should be aware of in design and implementation of the remedial alternative for Operable Unit Two at the Site.

I. Overview

The recommended alternative addresses the ground water contamination by restricting access to the contaminated ground water through imposition of various institutional controls and long-term ground water monitoring. The major components of the selected remedy for Operable Unit Two include:

- the implementation of a long-term ground water monitoring program;

- the construction of four additional ground water monitoring wells downgradient of the source area;

- the implementation of institutional controls, which would include deed restrictions, zoning controls, and water supply well permitting prohibitions;

- the contingent construction of ground water extraction wells, in both the Upper Sand Unit and Lower Sand Units, located near the western boundary of the former operational area of the Site;

- the contingent installation of a ground water pumpingsystem;

- the contingent installation of a ground water filtration system;

- the contingent installation of a Granular Activated Carbon (GAC)Treatment system;

- the contingent installation of a treated effluent discharge system;

- the transportation and disposal of the GAC and filtration waste to a TSCA-compliant landfill or incinerator, if treatment is warranted; and

- long-term management controls including operation and maintenance of the ground water treatment system if warranted.

Items 1 through 3 will be immediately implemented. The implementation of items 4 through 10 of this alternative would be contingent upon confirmation of PCBs at downgradient compliance monitoring wells. Confirmatory sampling must occur within sixty days of receipt of the original monitoring results that show elevated PCB concentrations.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

The community, in general, has no objections to the selection of the recommended alternative.

II. Background on Community Involvement and Concern

In accordance with CERCLA sections 113 and 117 requirements, a Community Relations Plan (CRP) for the Yellow Water Site was finalized in September 1990 and later revised to include the Operable Unit Two activities. This Community Relations Plan outlines citizen involvement and the community's concern.

The most active period of community involvement with the Yellow Water Road site occurred during 1984/1985 when EPA proposed to bring a portable incinerator on-site to burn PCB-contaminated materials stockpiled by EPA. Because of community opposition to on-site incineration, EPA decided against incineration as a viable alternative for remediating PCB-contaminated soils stockpiled within the former operational area of the site.

Media coverage for the site has been sporadic since 1984. Minimal community involvement has occurred with regard to the site since 1985.

An RI Fact Sheet for the Yellow Water Road site was issued to the public in December of 1988. The OU1 Administrative Record was made available to the public in the information repository located in the Baldwin City Hall and at the EPA Records Center in Region IV. Following the release of the OU1 RI/FS Fact Sheet, an availability session was held on Tuesday, May 29, 1990, from 7:00pm to 9:00pm at the Mamie Agnes Jones Elementary School. At this meeting, EPA officials provided an update on site related activities in addition to answering questions from concerned Jacksonville citizens.

The public was provided an opportunity for public comment on the remedial alternatives for OU1 from August 28, 1990 to September 27, 1990. In addition, a public meeting was held on September 4, 1990 in Baldwin, Florida, to present to the community EPA's preferred alternative for OU1 source remediation. During the public meeting, the community was informed of the availability of a Technical Assistant Grant (TAG). A response to the comments received during the public comment period is included in the Responsiveness Summary, which can be found in Appendix B of the OU1 Record of Decision.

The OU2 RI/FS Reports and Proposed Plan were released to the public for comment in May 1992. These documents were made available to the public in both the administrative record and the information repository located in the Baldwin Town Hall. A public comment period was held from May 7, 1992 through June 6, 1992. In addition, a public meeting was held on May 18, 1992 to answer questions about problems at the Site and the ground water remedial alternatives under consideration.

Only a limited number of community members attended the public meeting. Most of the attendees were city and local government officials who expressed little concern about the selected remedial alternative. Most comments made during the meeting were about the specifics of the alternative, requesting detailed information about the construction and operation and maintenance of the alternative.

The main concern expressed by the community residents concerned the quality of their drinking water supply wells. It was explained that their domestic wells were all located upgradient of the source of contamination and that sample results from their wells showed no detectable contaminant levels.

The following section highlights and addresses the issues of concern. A response to each comment received during the comment period has been provided below.

III. Summary of Major Questions and Comments Received During the Public Comment Period and Public Meeting

1.) One commenter inquired about the Technical Assistance Grants (TAG) which EPA can provide to a local community group for the purpose of providing technical aid in interpreting the site-related superfund documents. The commenter was concerned with the amount of time it would take to apply for and receive such a grant.

EPA Community Relations Coordinator Response: The Technical Assistance Grant is a $50,000 grant available to one community group per Superfund site for the sole purpose of hiring an objective technical advisor to interpret or explain EPA's documents and site-related data to the community. The TAG application process was designed to take a maximum of four months from application to receipt of the grant; however, it is currently taking six to nine months to complete the process. EPA Region IV is working to shorten this period by making personnel available to aid the community group in filling out and submitting the necessary application. In Region IV, there is a toll-free number (1-800-4359234) which the interested group can call and request information about community involvement or assistance with the TAG applications.

2.) A commenter asked to what level current engineering technology can treat ground water contaminated with Polychlorinated Biphenyls (PCBs).

EPA Response: The technical impracticability of using pump and treat to remediate ground water contaminated with PCBs has little to do with the treatment process itself, but rather with the amount of time required to achieve the established cleanup goals (federal MCL of 0.5 ppb). It is time not concentration that is the key factor in ground water remediation at the Yellow Water Road site. Due to the affinity of PCBs for soil and solid material, it is very difficult to "pull" the PCB contamination from the aquifer material. For every pore volume of ground water extracted from the aquifer during pump and treat, only a small fraction of PCBs is extracted from the aquifer material.

Eventually, the health-based standards will be achieved, but the timeframe is in excess of 1,000 years.

3.) A commenter inquired about the proposed remedy at the Site. The commenter questioned whether bioremediation might be feasible in light of the cost effectiveness it may afford.

EPA/PRP Response: During the Feasibility Study, EPA evaluated insitu bioremediation as a possible remedial alternative. It was dismissed from final consideration based on the fact that no one has fully developed thetechnology for PCB remediation in-situ. In fact, there have been no pilot or bench scale studies of this technology performed on sites with PCB-contaminated ground water. One of the biggest problems with bioremediation of PCBs is that they are relatively recalcitrant and therefore, not susceptible to the degrading biological processes.

4.) The PRPs raised several questions about the specifics of the long-term ground water monitoring program:

a. Where will the Point of Compliance (POC) wells be located?
b. What will be the frequency of monitoring for the POC and source wells?
c. Which PCB-concentration standard will be used to trigger the contingency?

EPA Response: The questions posed by the PRPs are answered within the text of the Record of Decision; however, separate responses are provided below:

a. The Point of Compliance wells will include the wells of existing monitoring clusters MW-9 and MW-10, in addition to those of the "to-beinstalled" clusters, MW-12 and MW-13. The wells in cluster MW-10 are located approximately 30 feet downgradient of the known source area and the new wells of clusters MW-12 and MW-13 will be located an equal distance downgradient of the existing monitoring clusters MW-8 and MW-7, respectively. All POC wells are located a safe distance from the source boundary and within the known flowpath.

b. The monitoring frequency for the POC wells will be quarterly for a period of two years. At the end of the two-year period, if historical data from the source area wells indicate PCB concentrations are stable or declining with time, EPA will consider a less frequent POC monitoring schedule (semiannual). After EPA's five-year review, and again if PCB concentrations in source area wells continue to be stable or decline, the monitoring frequency may be altered by EPA to allow annual monitoring of POC wells.

   The long-term monitoring of the source area wells will consist of quarterly monitoring. This monitoring frequency will be maintained for a period of two years. After this two-year period, EPA will evaluate the monitoring results, possibly reducing the monitoring frequency to semi-annual. After EPA's five-year review, if historical data indicates stable or Non-Detect PCB concentrations, EPA will evaluate the use of an even less frequent monitoring schedule (annual) for these well nests. All collected ground water samples will be analyzed for PCBs.

c. The Federal MCL of 0.5 ppb will be used as the ground water remediation level for the

Site. Implementation of the contingent remedy will be triggered by two consecutive sampling results, within a sixty-day period, which reveal PCB concentrations at or above the federal MCL.

IV. Remaining Concerns

The community's concerns surrounding the Yellow Water Road site will be addressed in the following areas: community relations support throughout Remedial Design/Remedial Action.

Community relations will consist of making available final documents (e.g., Remedial Design Work Plan and Remedial Design Reports) in a timely manner to the local information repository for the site. EPA will also issue fact sheets to those on the mailing list to provide further information on progress of the project and schedules for future activities at the site. EPA will inform the community of any principal design changes made during the project design. If, at any time during the Remedial Design or Remedial Action, new information is revealed that could affect the implementation of the remedy or if the remedy fails to achieve the necessary design criteria, the Record of Decision may be revised with an opportunity for public comment.